

# Mecheleciv

VOL. 18

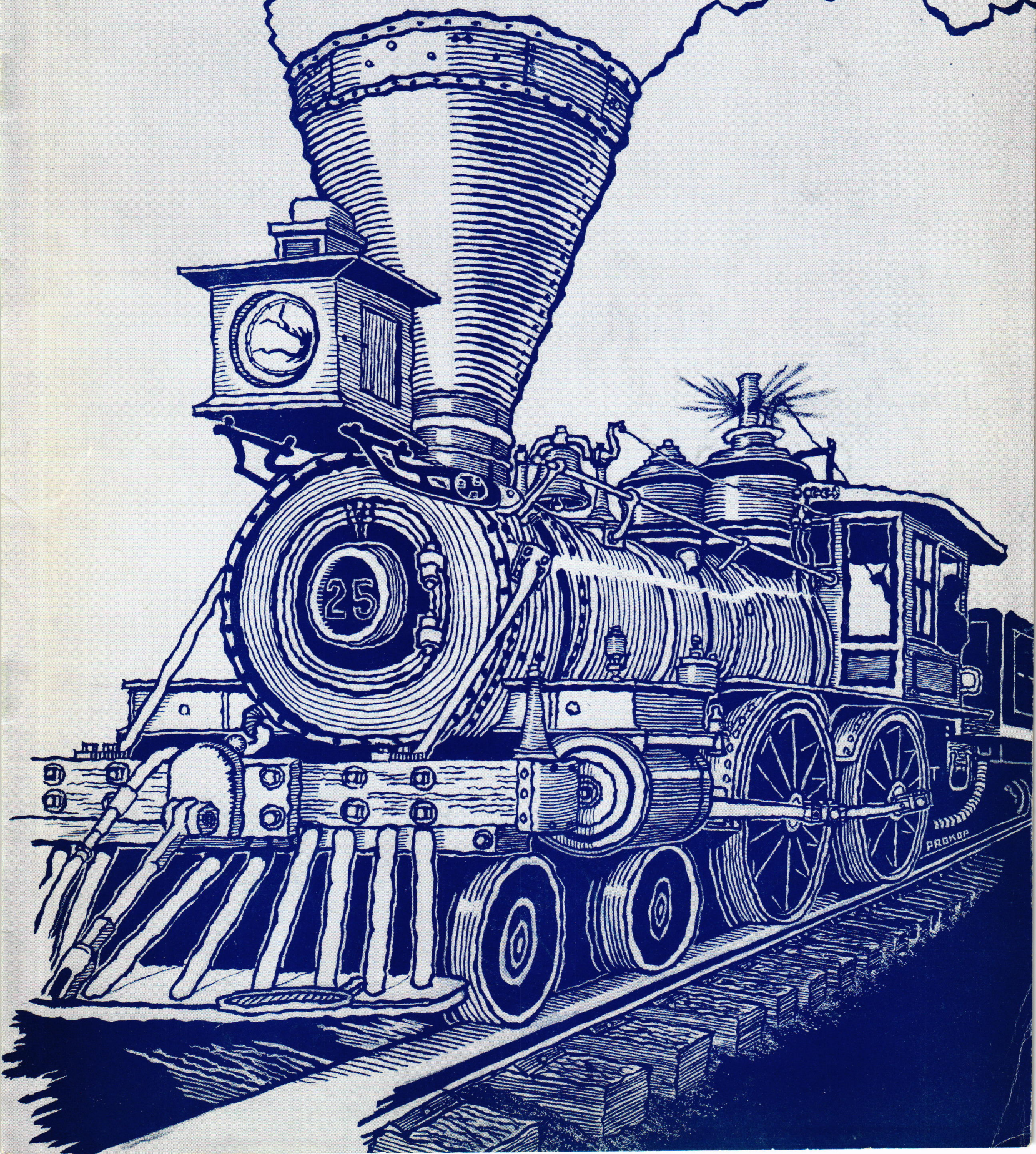
NOVEMBER, 1958

NO. 2

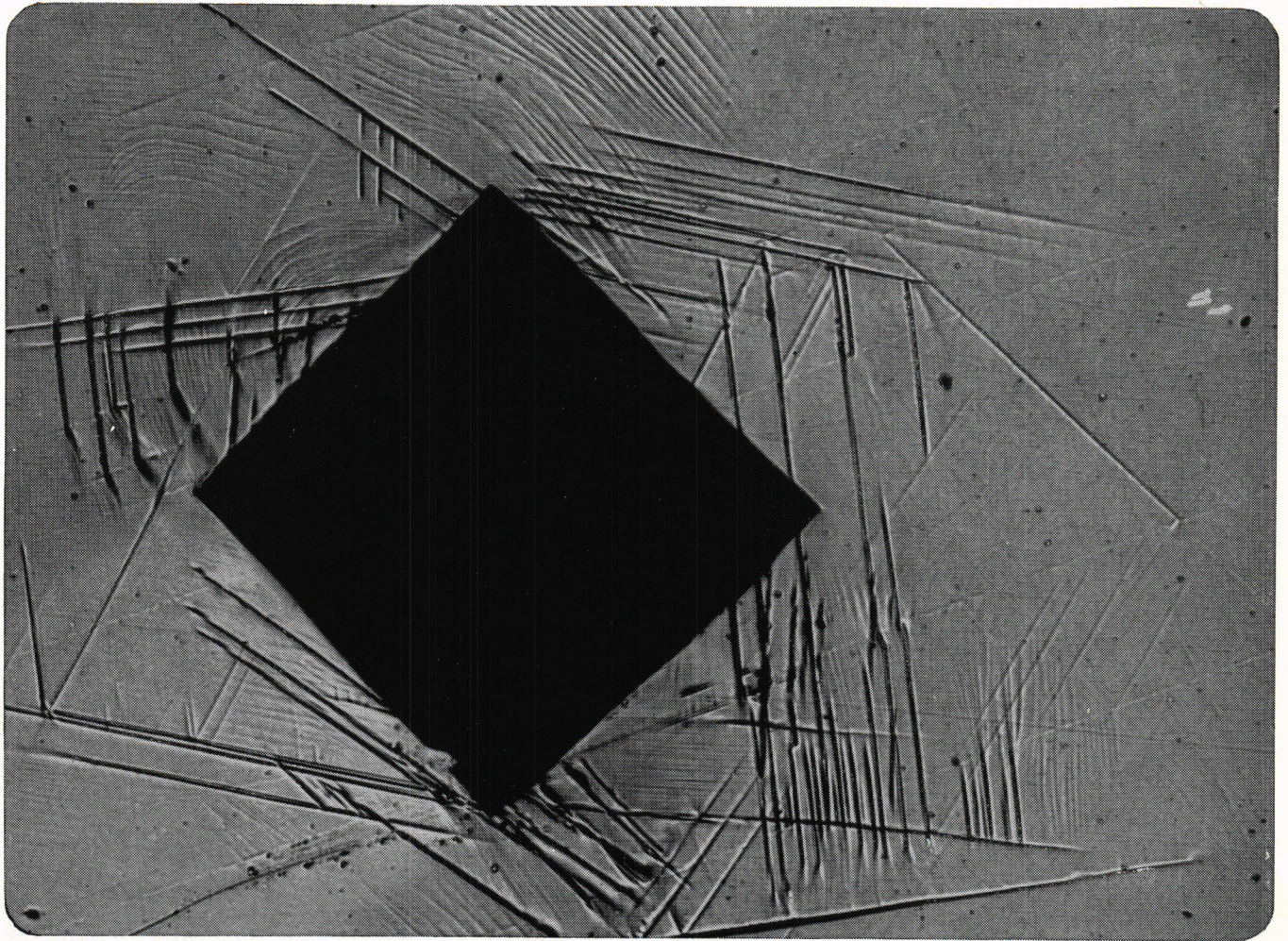
IN THIS ISSUE:

B & O MUSEUM

FLUID LAB







Did you ever hear  
atoms move?

The physicist positions a single crystal of age-hardened steel under the sharp diamond penetrator. He touches a pedal, and the pyramidal tip of the diamond squeezes into the polished surface of the steel.

The instant that it touches, things begin to happen inside the crystal. Atoms begin to slip and slide, in layers. Some layers abruptly wrinkle and corrugate. If you listen hard when this happens, you hear a faint, sharp "click." This is the sound of atoms suddenly shifting within the crystal.

You can see the action, too — or, rather, the results of it. The photomicrograph above shows the characteristic ridges and ripples. The black diamond in the center is the depression made by the penetrator.

By studying these patterns, and correlating the information with other data, scientists at U. S. Steel are trying to learn what happens atomically when a steel is bent, flexed or broken. Secrets thus learned are helping us to develop new and better steels not only for everyday products, but also for missiles, rockets, submarines, and other intricate machines to explore the universe above and the world below us.

"Tomorrow" is an exciting word today — and never more so than at United States Steel where we are accepting the challenge of the future with energy, resourcefulness and confidence.

*USS is a registered trademark*





# There's a Metal Problem in your future that Inco can help you solve

*In the meantime, see if you can tell which nickel-containing alloy proved to be the answer to these problems.*

Number the picture captions!

- 1** Nickel cast iron
- 2** Chromium-nickel stainless steel
- 3** 4340 constructional alloy steel
- 4** Ductile Ni-Resist\*
- 5** Cupro-nickel
- 6** Nickel-aluminum bronze
- 7** Ni-Resist nickel cast iron

\*Registered trademark

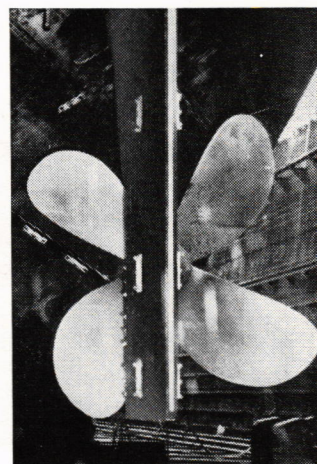
See answers below



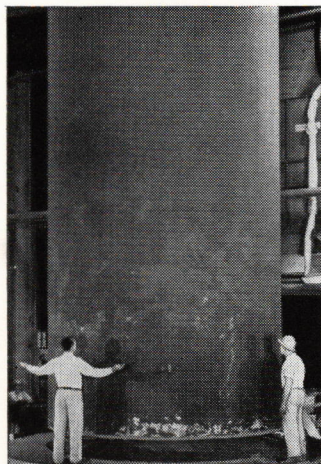
☐ **Piston ring carrier insert**—Needed: wear resistance, thermal expansion to match aluminum. Which alloy?



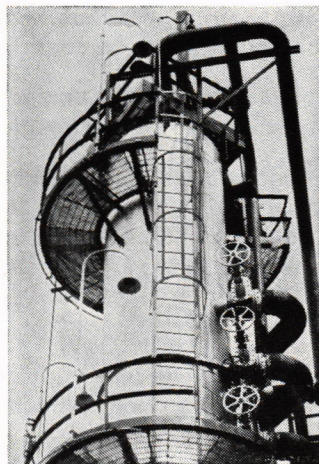
☐ **Grader drive axle**—Needed: toughness, impact resistance, greatest strength, with least weight. Which alloy?



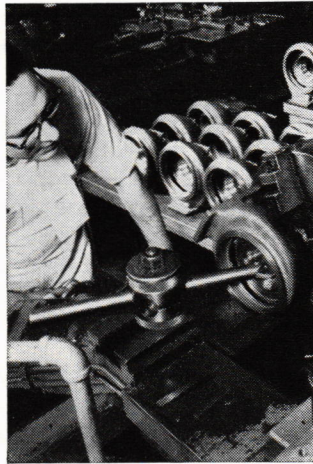
☐ **Ship's propeller**—Needed: light weight, high resistance to erosion, sea water corrosion. Which alloy?



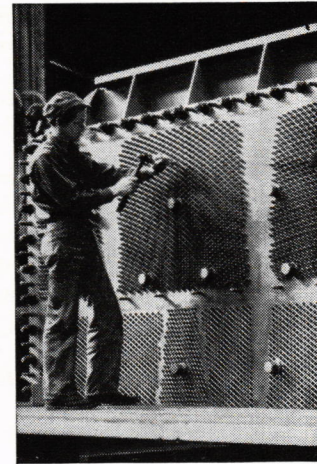
☐ **Yankee dryer roll**—Needed: high strength, uniform structure in cross sections of heavy castings. Which alloy?



☐ **Catalytic polymerization tower**—Needed: resistance to phosphoric acid at 375°F, 500 psi. Which alloy?



☐ **Turbocharger housing**—Needed: resistance to thermal shock, heat, corrosion at 1500°F. Which alloy?



☐ **High pressure marine condenser**—Needed: heat transfer, stress, corrosion resistance. Which alloy?

You may have to take this kind of quiz *again*. You may be designing a machine which requires a metal that resists corrosion . . . or wear . . . or high temperatures. Or one that meets some destructive *combination* of conditions.

When you start to design equipment, you will have to select the proper material to meet given service conditions. Over the years, Inco Development and Research has suc-

cessfully solved many metal problems, and has compiled a wealth of information to help you.

For more on special problems solved with nickel-containing alloys, send for "Standard Alloys for Special Problems." Write The International Nickel Company, Inc., Dept. 189G, New York 5, N. Y.

The International Nickel Company, Inc.  
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## answers

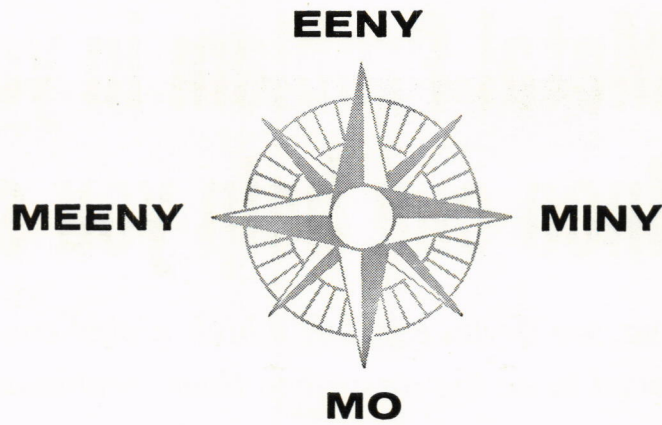
- Piston ring carrier insert.....7 Ni-Resist
- Grader drive axle.....3 4340 constructional alloy steel
- Ship's propeller.....6 Nickel-aluminum bronze
- Yankee dryer roll.....1 Nickel cast iron
- Catalytic polymerization tower.....2 Cr-Ni Stainless
- Turbocharger housing.....4 Ductile Ni-Resist
- High pressure marine condenser.....5 Cupro-nickel



**Inco Nickel**

*makes metals perform better, longer*





***Where will  
the '59 Graduate  
go?***

Industry's demand for capable graduates in the fields of science and engineering is still exceeding the supply produced by American colleges and universities. As a result, the most promising members of this year's class may well wind up with a *number* of openings to consider.

In such circumstances, who would blame a bright young man for at least letting the phrase "eeny, meeny, miny, mo" slip through his mind!

Of course, there is one inescapable conclusion to be considered: openings are one thing, genuine opportunities quite another. Thoughtful examination of such factors as potential growth, challenge, advancement policy, facilities, degree of self-direction, permanence, and benefits often indicates that real opportunity does not yet grow on trees.

Moreover, the great majority of personal success stories are still being written by those who win positions with the most successful companies.

For factual and detailed information about careers with the world's pioneer helicopter manufacturer, please write to Mr. Richard L. Auten, Personnel Department.

## **SIKORSKY AIRCRAFT**



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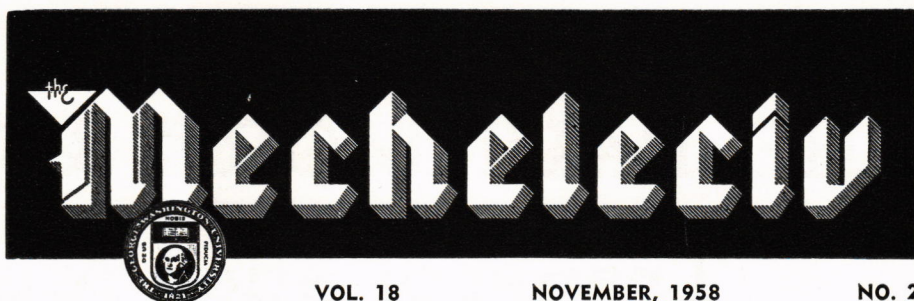
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NOVEMBER, 1958



VOL. 18

NOVEMBER, 1958

NO. 2

SCHOOL OF ENGINEERING, THE GEORGE WASHINGTON UNIVERSITY

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### COVER

This impressive locomotive drawn by John Prokop has been called the prototype of the locomotives that followed. This was the first attempt at beauty in the locomotive and yet there was no sacrifice of utility.

Published at the George Washington University by direction of the Engineers' Council. Published six times during the school year in October, November, December, March, April, and May. Entered as second class matter March 6, 1951, at the Post Office at Washington, D. C., under the act of March 3, 1879. Address communications to Mecheleciv Magazine, Davis-Hodgkins House, George Washington University, Washington 6, D. C., or telephone STerling 3-0250, Extension 528.

Subscription Price: Two Dollars

CHANGE OF ADDRESS: Send your new address at least 30 days before the date of the issue with which it is to take effect.



# THE BALTIMORE & OHIO Transportation Museum

By JOHN PROKOP

In an unpretentious section of Baltimore, at Pratt and Poppleton Streets, stands Mt. Clare Station, the entrance to the Baltimore & Ohio Railroad Museum. Here the first passenger train ticket in America was sold 128 years ago, in 1830. Visitors pass through Mt. Clare Station, claimed by the B&O to be the oldest railroad station in the world, to enter the three buildings which comprise the Museum.

The "big show" is in the elegant, old Mt. Clare Roundhouse. In this huge building is exhibited the B&O's unequalled collection of rustic locomotives and railroad cars; each one is a monument to the engineer who designed and, probably, helped build it. Although the Museum is devoted largely to railroading, the collection presents the progress of transportation. It also contains the predecessors of the locomotive; there are primi-

tive ox carts, rickshaws, conestoga wagons, and the horsedrawn cars of the early railroad, all of which represent man's early struggles with the transportation problem.

The Roundhouse also houses the "Pangborn Models," constructed by a B&O official, Major Joseph G. Pangborn for the 1893 Chicago World's Fair. These models, made of wood and painted to resemble metal, are full-size replicas of the experimental attempts of early steam pioneers. Among the amusing and fantastic machines included in this collection are replicas of Evan's Scow, one of the first amphibious vehicles; George Stephen's famous "Rocket," built in England in 1829; and Issac Newton's steam engine which was powered by the propulsion principle similar to that of a jet.

In the annex building there are many smaller interesting exhibits, including models of railroad bridges which are used frequently to explain problems of bridge construction to engineering students. The annex also houses the B&O's elaborate "O" gauge miniature railroad which is valued at \$25,000. The exhibits and many other various items trace the growth of railroading from its conception. Of particular interest, of course, are the items that tell the story of the growth of the Baltimore & Ohio. Railroads played an important role in American history, especially in the development of the frontier, and the B&O's history is impressive as well as colorful.

The first railroads in America were small, private ones operated by mining companies that used horse-drawn cars. The idea for a commercial public railroad was conceived in 1827 by Baltimore businessmen as a means of competing with the Erie Canal for the highly profitable in-



THE "TOM THUMB" — 1829  
First American-built locomotive to operate on a  
commercial railroad



land trade of the Ohio Valley region. On February 12, 1827, under the direction of Phillip E. Thomas, plans were made; by February 28th the Charter was drawn, and the B&O became the first chartered railroad in America and the first railroad devoted to the needs of the public.



**THE "ATLANTIC" — 1832**  
Nicknamed a "grasshopper" because of it's long, spindly connecting rods

On July 4, 1828, the B&O began construction, but it was 1830 before the first horse-drawn cars were able to operate. But the "Hayburners," which performed well on short runs, were an unsatisfactory source of motive power, because fresh horses had to be put in harness every few miles. Also, once the railroad reached far into the Ohio River Valley, the speed of the horses would not be able to match that of the canal boats over the same distance. The Chesapeake and Ohio Canal, planned by Washington, D. C. businessmen, also began construction on July 4, 1828. It had the same goal as the railroad and if the canal were successful, it would make the B&O's horse system obsolete and draw more trade away from the port of Baltimore. Faced with this competition, the railroad was forced to seek a better form of motive power. An imported English steam locomotive, the "Stourbridge Lion," was tested; it performed unsatisfactorily on the American rails. Ungainly and top-heavy, it continually jumped the 400 foot radius curves of the American track, which were only half the radius of the English track that the "Lion" required.

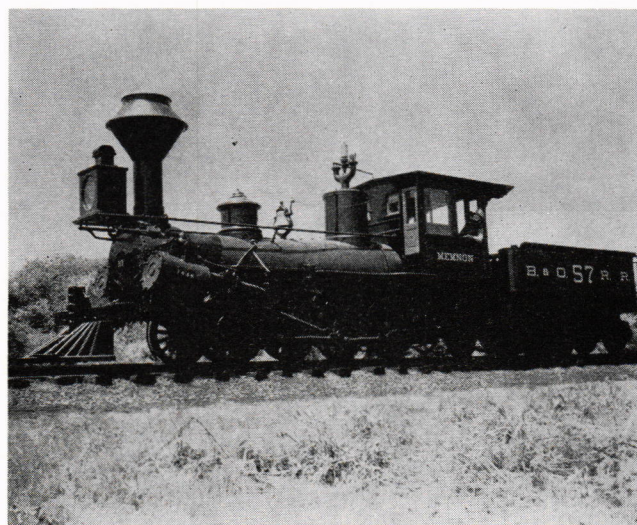
The B&O directors were disappointed by the locomotive's performance and became skeptical about the materialization of the plan for a great railway into the Ohio River Valley. However, Peter Cooper, the New York philanthropist and financial genius, had speculated in real estate throughout the Baltimore area, and he hoped to sell land to the B&O as the railroad expanded.

Cooper, a dynamic man, did not let the failure of the "Lion" discourage his intentions. In 1829 he went to Baltimore and turned inventor-engineer. For six months, constructing without any plans and encountering many disappointments and failures, Cooper worked on an experimental locomotive which would meet the requirements of the Baltimore & Ohio directors. The result of his engineering effort was the fabled "Tom Thumb," the first American-built locomotive, a replica of which is in the museum.

The historical race between the "Tom Thumb" and the gray horse occurred on May 28, 1830, as the locomotive was making the return trip to Baltimore after a trial run. The Tom Thumb was ahead of the horse when a belt that operated the blower for the fire slipped from its pulley. The locomotive lost steam and dropped behind, and the horse won the race.

Despite the catcalls and jeers from skeptics about the superiority of the "iron horse" over the flesh and blood horse, the Tom Thumb in subsequent trials proved that the steam engine was here to stay.

On January 4, 1831, the B&O advertised for locomotives and later announced that a competition would be held among bidders to determine which one would get the contract. The contest was won by Phineas Davis, a watchmaker from York, Pennsylvania. His locomotive, the "York," was placed in service on the B&O line in June of 1831 and it was used until 1834. By the autumn of 1834, though, the B&O had four other locomotives in service. They were the "Atlantic," "Traveler," "Arabian," and the "Mercury." All were of the famous "grasshopper" type, so-called because the long, spindly, connecting rods that extended vertically from the pistons down to the



**THE "MEMNOR" — 1848**  
Nicknamed the "Old War Horse" because of it's Civil War Service

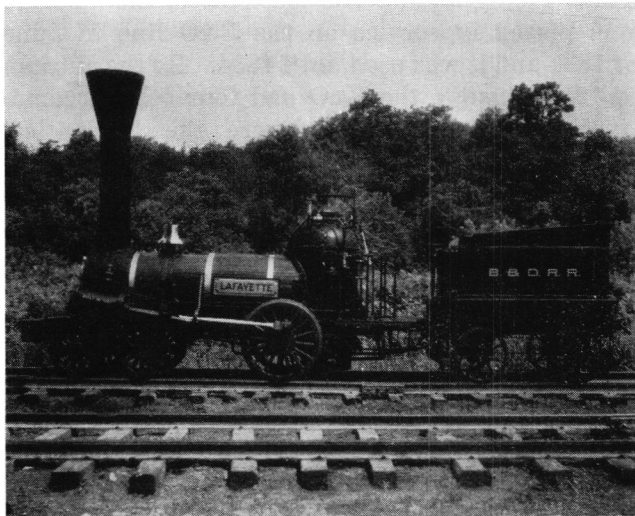


drivers of the wheels resembled the hind legs of a grasshopper.

The operators of these early locomotives must have been a proud and gritty lot. Toughened by the elements, their arms and bodies scarred from contact with the exposed steam pipes, they piloted their cabinless locomotives in all kinds of weather. Traveling along behind the engines in the swaying, creaking, double-deck Imlay coaches, the passengers fared a little better, but occasional showers of soot and sparks, belched from the smokestacks, caused anxiety and discomfort.

The early mechanical and civil engineers of the B&O were many times the pioneers in early railroads experiments and research, and they disseminated their knowledge free to the many enterprising railroad companies that were springing up.

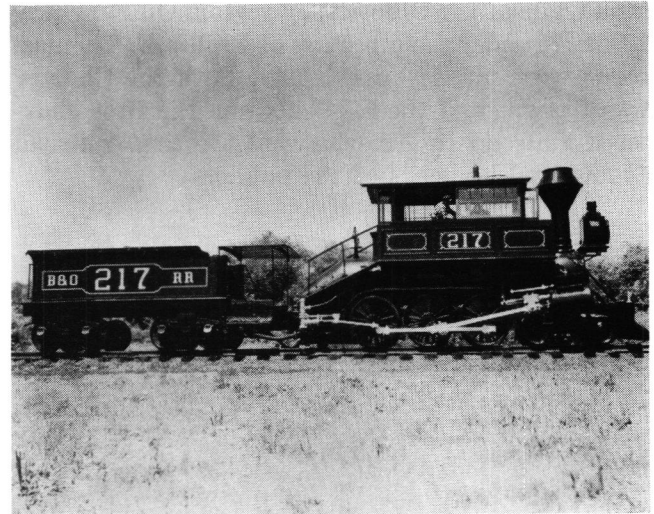
Often the B&O surveyors and engineers found that human obstacles were a more formidable foe than natural obstacles. Bandits, irate land owners, equipment thieves, and fanatics who resented the intrusion of the "new-fangled steam contraption" hindered the progress of laying the rails. Another problem was drunken workmen; whiskey cost three cents a glass and it was often difficult for the road construction engineers to get the rugged foremen and their drunken crews out on the job.



**THE "LAFAYETTE" — 1837**  
First B&O locomotive with horizontal boiler

It was in this early period that bridge building began to develop into a science. Many of the original bridges and trestles had to be replaced to accommodate the heavier weight of the newer locomotives; however, one, the B&O's "Carrollton Viaduct," the first stone-arch railroad bridge in America, is still being used by trains in Baltimore, despite the fact that it was built in 1829.

The mechanical engineers started from scratch and at first they built and developed engines



**THE "DAVIS CAMEL" — 1873**  
One of the most useful and numerous of B&O types

by the trial and error method. Among the names of early locomotive designers, that of Ross Winans is conspicuously identified with the B&O. Winans, a New Jersey horse dealer, came to Baltimore in 1828 to sell horses to the B&O and stayed instead to design and build locomotives. In 1848 he brought forth his famous "Winan's Camel," a husky freight locomotive. The locomotive received the nickname "Camelback" because its extremely long firebox made it necessary to place the engineer's cab on top of the boiler.

Another locomotive, the "Thatcher Perkins," also named after its builder and designer, was the first ten-wheeler on the B&O line. It was introduced in July of 1863 to provide the tractive power necessary to haul the first-class passenger trains over the Alleghenies and into the Ohio Valley. The Thatcher Perkins' design, forceful and impressive, possesses graceful lines that are accented by decorative colors; its overall appearance is one of attractive Victorian elegance.

In the period following the Civil War the design of the steam locomotive lost much of its former elegance because of the influence of the "industrial era." The "J. C. Davis," built in 1875 and nicknamed the "Mogul" because it was the world's largest locomotive at that time, was the last great B&O engine to possess the distinctive features of Victorian design. Then, as our nation expanded, powerful, brutish engines were developed to move the increased freight and passenger traffic of the new industrial markets.

In 1935, the B&O introduced its Royal Blue, the first streamlined diesel-electric passenger-train locomotive on an American railroad. Finally, in 1937, the B&O purchased the massive EM-1 Mallet engines, the largest and last steam locomotives bought by the company. Today, the B&O

*(Please turn to page 14)*



# FLUID LAB

— With VIC WOODHALL, BS '59

"Let's go, man!"

"Ah, what's the hurry?"

"My wife never believes I can be in lab so late and get wet, too."

"Let's hit it, then. Who read the problem?"

"Don't look at me, jazzbo, there isn't even a file on this one."

"What's all this crap about pressure in feet heads of water?"

"I thought it was in Rubins per Mathews."

"Naw, that's absolute; we want lbs./ft.<sup>2</sup>"

"Let's get started man, we've been here thirty minutes."

"Okay, okay, let's— Don't turn that valve, Chuck!"

"Damn, my wife will never believe I got wet to my knees in class."

"Hey, look at the hydraulic jump."

"If you don't leave those valves alone, Chuck, I'll . . ."

"Have you read that problem yet?"

"It looks like all we do is to get the syrup down to freezing, slap it under the viscometer, get data and take off."

"Stop! that's my rabbit's foot."

"Ah, don't get shook. We've got to stir this syrup with something."

"The moose said an idiot could solve this problem."

"Yeah, but what about engineers?"

"Man, this syrup is thick. I don't think it will even pour . . ."

"Damn it Jack, the syrup will never come off my new white bucks."

"How many RPM is this thing supposed to do?"

"Just take a low and high reading and we'll extrapolate."

"Listen, this is the last time I'm asking—  
**PUT OUT THAT CIGAR!**"

"Cigar hell, that's the viscometer."

"Well, unplug it, stupid."

"Why? The fuse blew."

"One of these days, Vic . . . , POW!"

"Hey, let's quit horsing around, everyone else has gone."

"Okay, let's run one more check on this and go."

"Hold it—that's *my* coffee."



"How did you do in Fluid Lab Vic?"

"Watch it! Don't turn that."

"Watch the safety valve, Chuck's done it again."

"Quick! Get the main valve, the water's already past my knees."

"That does it. I quit."

"Jeez, what was he mad about? He wanted the syrup off his bucks, didn't he?"

"Let's open the door to drain the water out."

"Yeah, let's go home. We can radio the rest of the data when we find out what we need."

"What's for next week, the sunken corpse?"

"You mean the floating block."

"That's it. I knew it was something about a CE."

"Hey, will someone please bring a file next time?"



# ***CHA CHA and THE PRESIDENT***

## ***. . . A Dog's Approach to Student Activities***

*By* WOODY EVERETT  
Council President

At about this time every year, it is customary for the leaders of the student organizations around the School of Engineering to begin racking their brains for ideas of getting fellow students interested in the extracurricular aspects of life here at G.W. This problem has perplexed yours truly for some time; therefore, while in a meditating mood the other evening, I decided to take it to an acquaintance of mine—namely, my wife's Chihuahua, Cha Cha. Now Cha Cha is quite a profound thinker, and we have discussed many and various problems before. Therefore, I was sure of reaching some type of logical solution from the ensuing discussion.

I immediately undertook to explain to Cha Cha that the School offered many activities that were much in demand among the scholastic gatherings of other universities. Despite the fact that our own School of Engineering sponsors a magazine, keeps its own house for the use of engineering students, furnishes refreshments at occasions like the annual Engineers' Mixer, provides an evening of entertainment at the Engineers' Banquet and Ball, and supports other worthwhile activities, the students do not seem to appreciate the activities enough to help plan and promote them; in fact, many of the students do not even take the time to attend the various functions! Well, Cha Cha wrinkled his brow and began to concentrate on the problem that is worrying members of that select group of workhorses known as the "student leaders."

For some time this group of "workhorses" has considered everything, short of launching a guided missile from the top of Tompkins Hall, that might attract the attention of the erstwhile engineering students. Are student activities something of the past? Do the engineering students of this university have so much to do that outside activities are actually a bother? Would more people participate in extracurriculas if there was

more reward at the end than the customary comment of a job well done? Would more faculty participation help the sad plight of student activities? What is the answer?

Poor little Cha Cha really had a load on his mind when he started considering the problem that had put grey hair into many a G.W. head over the past years. As the little dog's head drooped lower and lower, I knew that the problem was more than enough even for his profound mind. Well, just as I thought this problem would be the undoing of Cha Cha, in bounced my Siamese kitten, Merangue; she and Cha Cha boxed at each other and ran excitedly out of the room, leaving me all alone with the problem at hand. I therefore throw the problem to you, the reader, and earnestly solicit your thoughts and comments.

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# ENGINEERING SOCIETY NEWS

## AIEE-IRE

On February 4, 1959, Dr. Thomas J. Killian, Deputy Chief and Chief Scientist in the Office of Naval Research, will speak on "FUTURES IN ELECTRICAL ENGINEERING." Dr. Killian is the holder of patents on pressure control devices and electronic developments, and has authored publications on thermionics, discharges in gases, electronics, illumination, artificial day lighting, statistics and research planning and administration. He will speak about such technical fields as masers, cryogenics, information theory, computers, etc. These are topics that are in the laboratory today, but will certainly occupy a very prominent place in the electrical engineering field, tomorrow!

On March 4, 1959, Mr. Edgar T. Hughes, Chief of the Division of Electrical Resources and Requirements of the Federal Power Commission, will speak on the "FUTURE OF ELECTRIC POWER." Mr. Hughes has been with the Federal Power Commission, Bureau of Power, since 1938 and prior to that was connected with the Pennsylvania Power and Light Company in construction, system operations and evaluation. It is assumed that Mr. Hughes will cover such important new developments as the use of microwave relaying and protection, and the all important field of nuclear reactors for power generation.

On April 1, 1959, Mr. Robert M. Briber, Assistant to Dr. James R. Killian, the Special Assistant to the President of the United States for Science and Technology, will be guest speaker at our "Career Conference." Mr. Briber will speak about the less known and more or less obscure current fields in engineering science which by any

objective standard should be attracting attention. This will be an unparalleled opportunity for all engineering students to gain a brief insight into the many facets of their future profession where opportunities exist.

## ASCE

The student branch of the American Society of Civil Engineers started out the new school year living up to its reputation of being the most active, though the smallest, engineering society at the University. However, the branch is most desirous of attaining a larger membership. Any candidate for the B.C.E. or B.S.E. degree is eligible for membership. Freshmen and sophomores are particularly needed in order to carry on when older members graduate. Remember, it is to your advantage to join your professional society, since it affords you an opportunity to become acquainted with fellow students pursuing the same objective, and with facets of civil engineering not taught in the classroom.

At the meeting on December 3, 1958, Charles Conrad, Associate Director of the National Capital Planning Commission, will speak to the branch on the subject of urban planning. Mr. Conrad has been a member of the planning commission of Arlington County and is the city planner for Vienna, Virginia. He taught a course in Regional and Urban Planning at the University last spring. All candidates for B.C.E. and B.S.E. degrees are urged to attend. Refreshments will be served.

At a recent meeting of the Washington, D. C. chapter of the A.S.C.E., Les Robinson, student branch president, was given an award for being the outstanding student member of the A.S.C.E. in the metropolitan area. Congratulations to Les.

TO: ALUMNI EDITOR

Mecheleiv Magazine  
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The George Washington University  
Washington 6, D. C.

From: \_\_\_\_\_

Here are a few comments for ALUMVIEWS on where I am working, what I'm doing and news of my family.

Degree and Date \_\_\_\_\_

Fraternity \_\_\_\_\_



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You may request your graduate school from the following seven institutions: University of Southern California, Stanford University, UCLA, University of Arizona, Purdue University, California Institute of Technology, and University of West Virginia.

Fifteen awards are open to applicants receiving their Bachelor's degree in Business Administration during the coming year.

The work program will involve interesting assignments in the administrative areas of the company and graduate study will be at UCLA or University of Southern California.

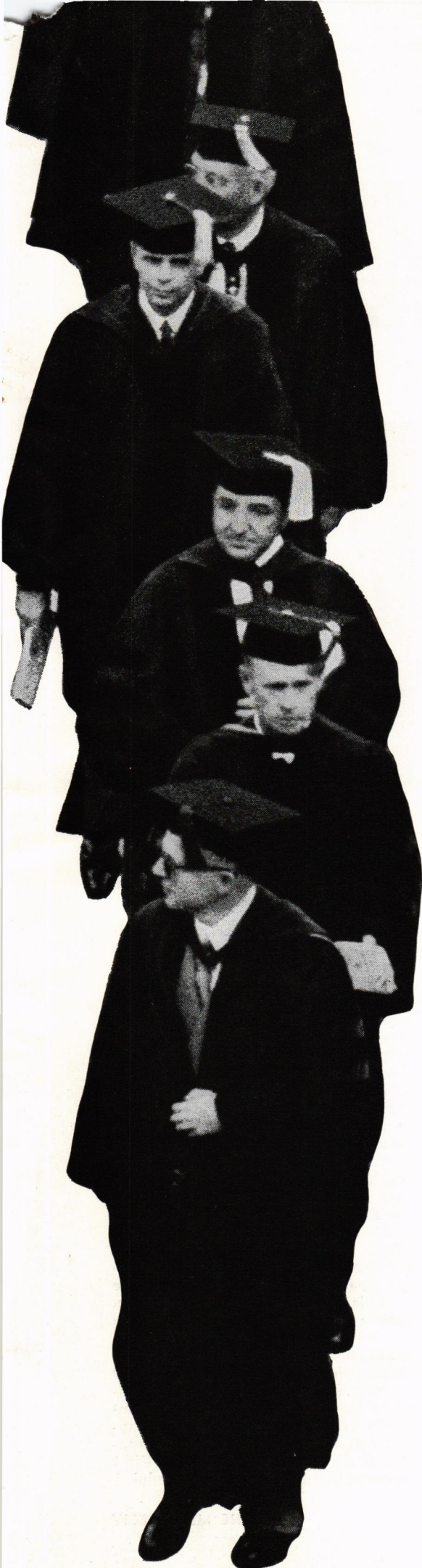
Salary is commensurate with your ability and experience and all company benefits are extended to those participating in the program. Tuition, fees, books and thesis preparation and reproduction expenses are provided and travel expenses outside of the Southern California area are paid.

Upon attainment of Master's degree, Fellows may apply for the Hughes Staff Doctoral Fellowship Program.

Consult your College Placement Officer for interview information. Or, write to the Office of Advanced Studies at the address at right.







## HOWARD HUGHES DOCTORAL FELLOWSHIPS

If you are interested in studies leading to a Doctor's degree or in post-doctoral research, you are invited to apply for one of the ten awards in the Howard Hughes Fellowship Program.

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The Howard Hughes Doctoral Fellowship provides an annual award of approximately \$7200, of which \$1800 is for tuition, books, fees, thesis and research expenses. The remainder is the award of a cash stipend and salary earned by the Fellow.

You should plan to pursue research in the fields of Electronics Engineering, Microwave Physics, Mechanical Engineering, Electron Dynamics, Electronic Computing, Physical Electronics, Propulsion Engineering, Solid State Physics, Aerodynamics, Analytical Mechanics or Information Theory.

The Fellowships are open to students qualified for admission to graduate standing. A Master's Degree or equivalent graduate work must have been completed before beginning the Fellowship Program.

Application closing date: January 15, 1959

**HOW TO APPLY:** *For information concerning either of the Hughes programs described, write, specifying program of your interest, to: Office of Advanced Studies—P.G.O., Building 6, Hughes Aircraft Company, Culver City, California.*

*The classified nature of Hughes work makes ability to obtain security clearance a requirement.*

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**HUGHES**

*Hughes Aircraft Company, Culver City, California*

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# NEWS IN INDUSTRY

ELEMENTS OF AN electric power station designed for use on the moon have been demonstrated by scientists of the Westinghouse Electric Corporation; basic components of the power station consist only of wire mesh and a chemically coated plastic. Giant sheets of a thin plastic material will be stretched and supported over several acres of the moon's surface. Coated on these sheets would be an extremely thin layer of photosensitive material. A thin wire mesh will then be placed parallel to, but slightly separated from the plastic sheet and insulated from it. The photoelectric generator would then be ready to produce electric power. As the sun's rays strike the plastic sheet, the coated surface will emit electrons. These electrons will strike the wire mesh, generating a voltage. Upon closing the circuit between the wire grid and the coated surface through a suitable load, current will flow. Once the power station is constructed, it would operate for 14 days of sunshine followed by 14 nights. With this type of lunar electrical network, continuous power could be assured to any point on the moon.

TWO RADICALLY NEW approaches to the problems of high nuclear fuel, equipment and design costs, which have thus far prevented the atom from competing with conventional energy sources, have now been proposed. The first concept introduces the use of mixed "light" and "heavy" water to control pressurized and boiling water reactors. This system would replace the costly and intricate control rod systems now widely employed. This new method is expected to increase the efficiency of fuel consumption up to 30 per cent and extract up to 75 per cent more heat from a water reactor core of a given size. The second concept concerns a new high temperature reactor coolant consisting of fine particles of solids suspended in gas. The advantages of this low pressure coolant lie in the reduction of both size and cost of major components of nuclear steam generating systems.

A MAJOR CHANGE in the design of standard light bulbs represents a basic departure from the familiar bulb. Somewhat cylindrical in shape, the new bulb has a greater surface



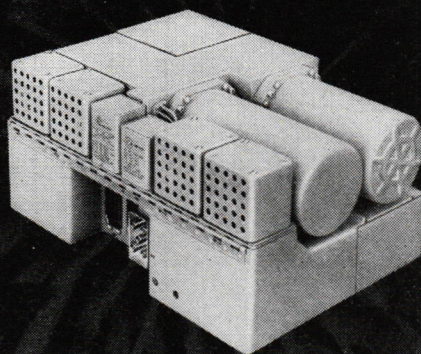
area than an ordinary bulb of the same diameter. This larger surface area permits more silica coating on the inside of the bulb, and since this silica coating serves to diffuse light, better light distribution results.

A 400-MILE LONG test range stretching from Edwards Air Force Base to Ely, Nevada, is being readied for the testing of the North American Aviation X-15 rocket powered test vehicle. The X-15 is a manned research airplane, designed to fly to a height of approximately 100 miles above the earth, and at speeds up to 3600 miles per hour. The X-15 program is expected to provide answers to actual flight conditions beyond the earth's atmosphere and also to increase knowledge of aerodynamic heating and heat transfer, including heat measurements on 600 points of the X-15's structure. It will also test man's reaction to space flight, the effects of weightlessness, acceleration and deceleration when leaving and re-entering the earth's atmosphere. The X-15 is 50 feet long, 13 feet high, with a wing span of 22 feet. It is fabricated mostly from Inconel-X, titanium and stainless steel to withstand temperatures in excess of 1000 degrees Fahrenheit. The rocket engines use liquid oxygen and liquid ammonia as propellants, with a consumption rate of some 20 times that for conventional jet-fighter engines. First powered flight of the X-15 is scheduled.





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This electronic centralized air data computing system, pioneered by AiResearch engineers, now enables aircraft to operate at maximum efficiency continuously. By sensing air conditions surrounding the airplane, it automatically makes in-flight adjustments and feeds vital information to the pilot. This centralized combination of transducers, computers and indicators is the most complete air data computing system ever produced by any manufacturer.

Many such pioneering develop-

ments are underway in challenging, important work at AiResearch in missile, electronic, nuclear, aircraft and industrial fields.

Specific opportunities exist in system electronics and servo control units; computers and flight instruments; missile auxiliary power units; gas turbine engines, turbine and air motors; cryogenic and nuclear systems; pneumatic valves; industrial turbochargers; air conditioning and pressurization; and heat transfer, including electronic cooling.

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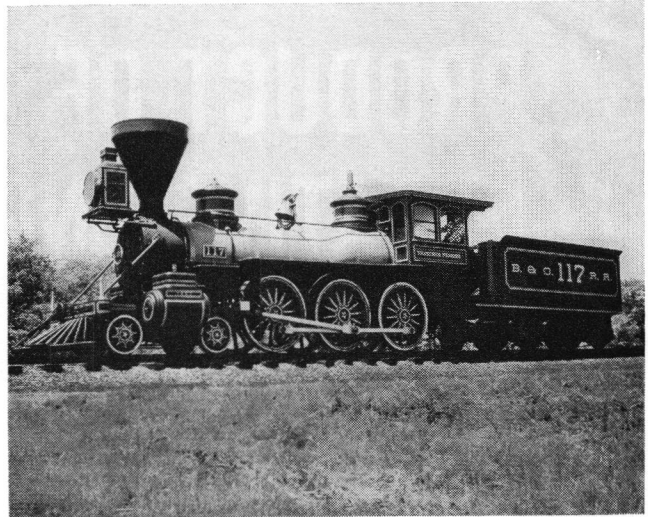
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**B&O** (Continued from page 6)



**THE "THATCHER PERKINS" — 1863**  
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relies mostly on deisel locomotives to haul its share of the nation's freight and passengers.

The B&O Museum provides a vivid history of the development of engineering achievements in transportation. The opportunities for engineers in the transportation field today are greater than they were in the early days of railroading. The immediate need for good engineers is great and the challenge to them is even greater. More of the revolutionary mono-rail trains must be built. The production of the "Atomic Locomotive" looms in the near future. The problems for the chemical engineer to solve are countless. Cheaper and faster ways of hauling freight are needed. The list is endless.

For more details about engineering opportunities write to Mr. W. H. Schmidt, Jr., Director of Public Relations, 1205 B&O Bldg., Baltimore 1, Maryland.

## *Excerpt From Changing Times*

A Harvard admissions committee reported recently:

"We are aware that high test scores and top class ranking in secondary school are not . . . very reliable evidence of real quality, intellectual or otherwise . . . We are concerned lest we over-value the conformist boy of high verbal facility who has always kept his nose clean, done what was expected of him and gone blinkered down the middle of the road grinding out top grades as he went . . . Passion, fire, warmth, goodness, feeling, color, humanity, eccentric individuality—we value these and do not want to see them give way to meek competence."

He's a nice guy, but . . .



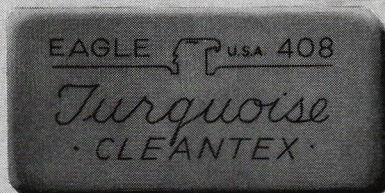
# are your pencils as sharp as your perspectives?

Efficiency reaches the vanishing point when you work with an inferior pencil—but hits a new high when you pick up an Eagle TURQUOISE. This is the drawing pencil that ranks first with professionals, and these are the reasons: 1. It gives you *uniform grading* (17 scientific formulas guarantee exactly the blackness you want—from every pencil, every time!). 2. It takes a strong *non-crumbling needle point* that stays sharp for line after long line of unchanging width. 3. You get inimitable smoothness—thanks to Eagle's exclusive "Electronic" graphite. TURQUOISE makes your perspectives look sharp—and you, too!

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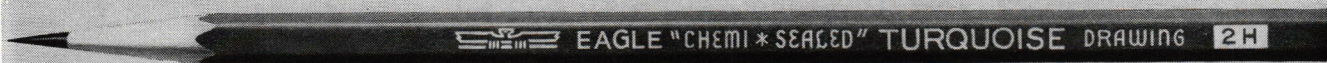
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- TURQUOISE DRAWING LEADS: Fit any standard holder. Grades 5B through 9H.

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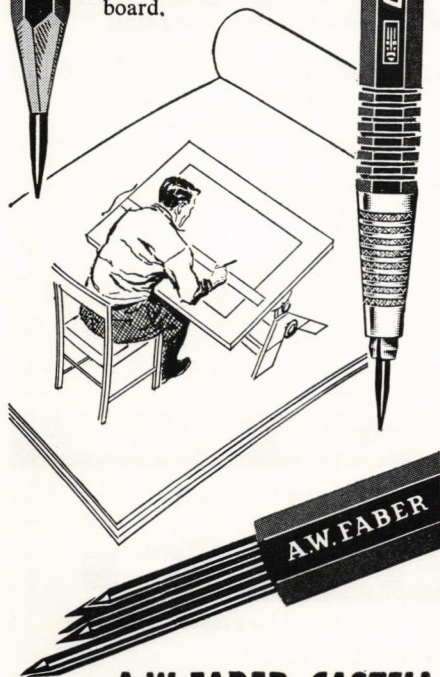
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# SLIPSTICK SLAPSTICK

Prof. Cruickshanks is my instructor, I shall not pass.  
He maketh me to exhibit mine ignorance before the whole class,  
He telleth me more than I can write,  
He lowereth my grade.  
Yea, though I walk through the corridors of knowledge,  
I do not learn.  
He trieth to teach me:  
He writeth the equations before me, in the hopes that I will understand them.  
He bombardeth my head with integrations,  
The sliderule freezeth up,  
Surely enthalpies and entropies shall follow me all the days of my life.  
And I shall dwell in the School of Engineering forever.

"Irritated Professor: "If there are any morons in this room, please stand up." —A long silence, then a lone freshman rose.

Professor: "What, do you consider yourself a moron?"

Freshman: "Well, not exactly, sir; but I do hate to see you standing all alone!"

C.E.: "Do you believe in free love?"  
Coed: "Have I ever sent you a bill?"

Since we call professors "profs" it's a snap to figure out what we ought to call assistants!

And as they say in mechanics—  
"Every couple has its moments."

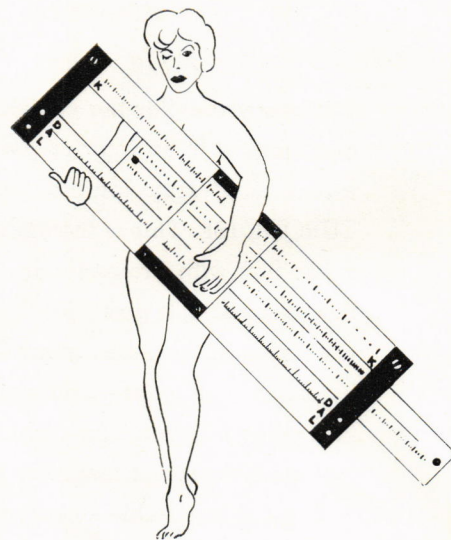
"Have you ever been pinched for going too fast?"  
"No, but I've been slapped."

Blonde: "Wouldn't you call it mental telepathy if we were both thinking of the same thing?"  
Engineer: "No, just plain luck."

Angry Father: "What do you mean by bringing my daughter home at this hour of the morning?"

Student: "Have to be in class at eight."

A smart girl doesn't have to watch the speedometer to know what her date is driving at.



## A CHEMICAL ANALYSIS OF WOMAN

Symbol: WO

Accepted atomic weight: 120.

Occurrence: Found wherever man exists. Seldom in the free state.

Physical Properties: Boils at nothing and may freeze at any minute. Melts when properly treated. Very bitter if used wrongly.

Chemical Properties: Very active. Possesses great affinity for gold, silver, platinum, and precious stones. Violent reaction when left alone. Able to absorb great amounts of expensive food. Turns green when placed beside a better looking specimen. Ages rapidly.

Uses: Highly ornamental. Useful as a tonic, in acceleration of low spirits, etc. Equalizes distribution of wealth. Is probably the most powerful (income) reducing agent known.

Caution: Highly explosive when in inexperienced hands.

Kid Brother: "Give me a nickel or I'll tell dad that you held hands with my sister."

E.E.: "Here you are."

K.B.: "Give me a quarter or I'll tell him you kissed her."

E.E.: "Here pest."

K.B.: "Now give me five dollars."



C.E.: "I suppose you dance?"  
Coed: "Oh yes, I love to."  
C.E.: "Great, that's better than dancing."

"Is this a picture of your fiancée?"  
"Yes."  
"She must be wealthy."

An old preacher was explaining the difference between faith and knowledge to his congregation.

"Now my brethren," he said, "hit's like dis: Dars Brudder Gregory a-sittin' thar with Sister Gregory and the five lil' Gregorys. She knows dey's his chillen—dat's knowledge. He believes dey's his chillen—dat's faith."

Physics professor: "If in going down this incline, I gain four feet per second, what will be the condition after 25 seconds?"

Smart Sophomore: "You'll be a centipede."

After a brief visit at a friend's house, Pat was amazed at how often his friend's grandmother read the Bible. Before leaving he asked why the elderly woman took such an interest in the book.

"Cramming for finals," was the reply.

A Russian school child was asked by his teacher, "Who is your father?" "Krushchev," was the answer.

"Who is your mother?"

"The great Soviet Union."

The teacher smiled at the astute child and said, "Now, what is your fondest wish?"

"To be an orphan," the child replied.

Bank President: "I like the way you handle money—where did you learn?"

Teller: "In Yale."

Bank President: "And what is your name, son?"

Teller: "Yohnson."

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NOVEMBER, 1958

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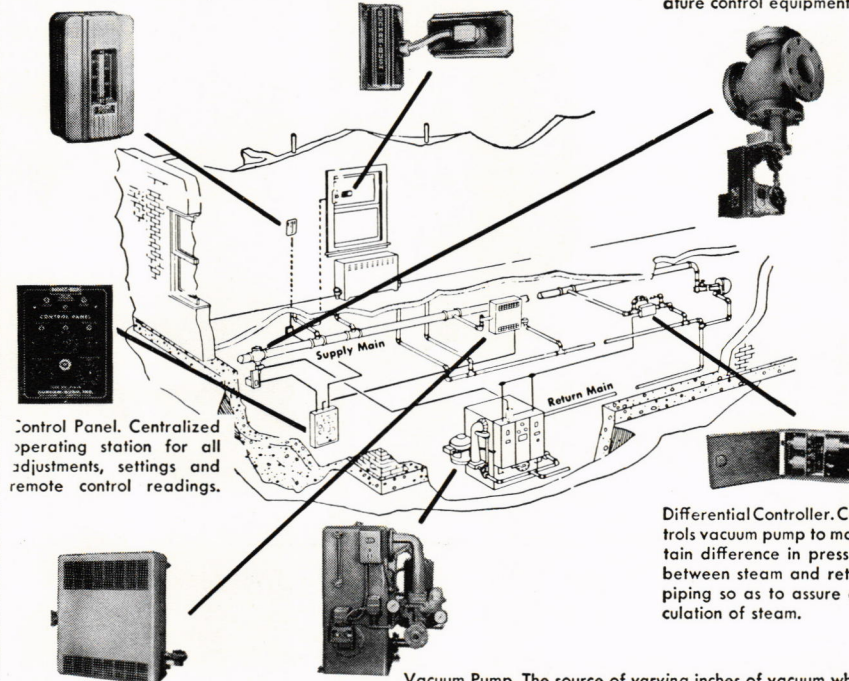
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\* The vacuum system which automatically varies the steam temperature

Room Resistance Thermometer. Serves as temperature limit control to prevent overheating and underheating.

Selector. Determines demand for heat by measuring the effect of outside weather conditions and inside building temperatures.

Control Valve. Regulates admission of steam into heating system, as called for by automatic temperature control equipment.



Heat Balancer. Measures rate of steam flow to system to balance heat input with heat demand.

Vacuum Pump. The source of varying inches of vacuum which assures steam in varying temperatures as required. Also produces necessary pressure differential between supply and return piping to assure quick, complete steam circulation and returns condensate from system to boilers.

Differential Controller. Controls vacuum pump to maintain difference in pressure between steam and return piping so as to assure circulation of steam.

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## *Homecoming Queen*



QUEEN REBECCA JANE HANZL was sponsored by the Engineer's Council on behalf of AIEE-IRE, ASCE & ASME. She is a brown eyed blond, majoring in history, and a member of Kappa Kappa Gamma.



## *Queen Candidate Finalists*



ANN MARIE SNEERINGER — Sigma Tau



SALLY ANNE LUDLOW — Student Bar Assoc.



BARBARA JOAN RAMAGE — Theta Tau



NANCY BARBARA ACKERMOM — Alpha Epsilon Phi





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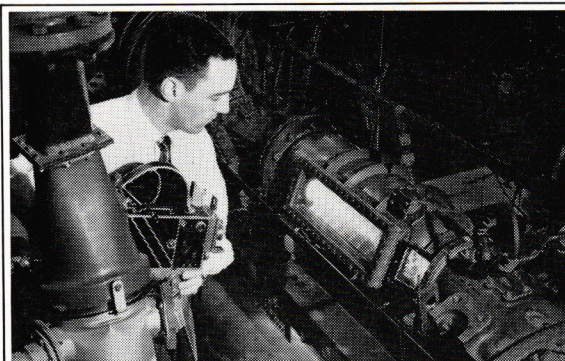
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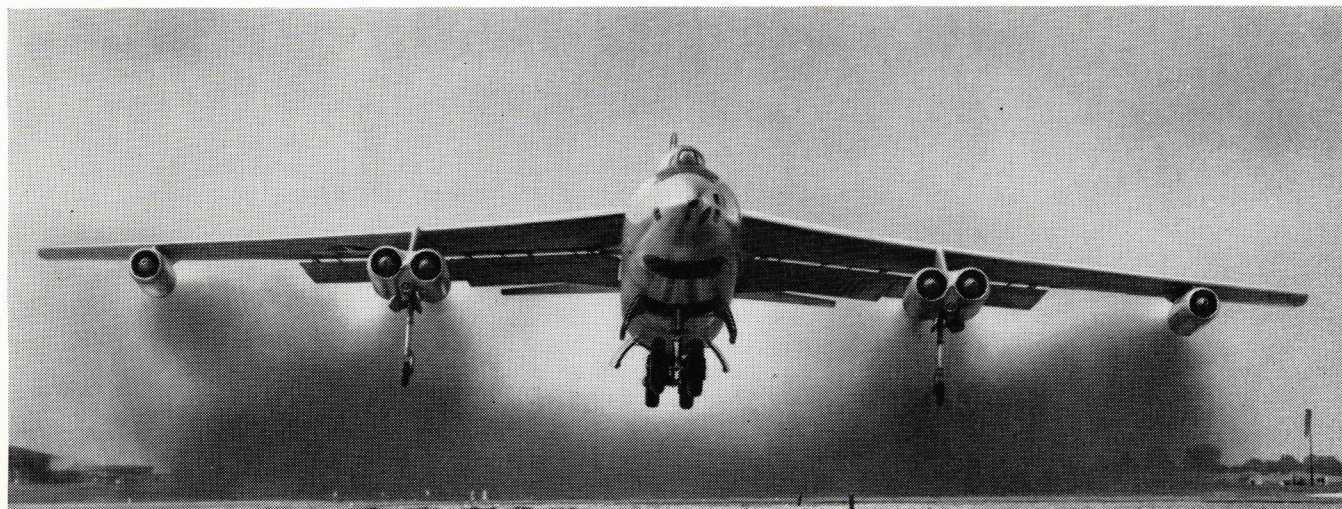
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## For Jets more thrust, more range, more payload



The motion picture camera is seeing into a turbo-jet combustion chamber operating on a new fuel.



With photography as a tool, the N.A.C.A. Lewis Flight Propulsion Laboratory studies jet engine combustion chambers, and compounds that can result in new high-energy jet fuels

How much faster and farther our aircraft and missiles can go seems now to depend on developing new high-energy fuels. This is a job of the Lewis Laboratory of the National Advisory Committee for Aeronautics.

And as in all kinds of industry, photography is playing an important role in this work. Motion pictures are taken of the interior of jet engine chambers through transparent walls. From the pictures the scientist learns the behavior of the fuel, the flame and exhaust through the engine turbine and tail pipe.

The use of photography in research and the development of new or better products is but one of the ways it is helping all kinds of businesses, large and small alike.

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TRADE MARK



One of a series

**Interview with General Electric's  
Frank T. Lewis  
Mgr., Manufacturing Personnel Development**

## **The Next Four Years: Your Most Important**

The United States is now doubling its use of electrical energy every eight years. In order to maintain its position as the leading manufacturer in this fast-growing electrical industry, General Electric is vitally interested in the development of young engineers. Here, Mr. Lewis answers some questions concerning your personal development.

**Q. Mr. Lewis, do you think, on entering industry, it's best to specialize immediately, or get broad experience first?**

A. Let me give you somewhat of a double-barreled answer. We at General Electric think it's best to get broad experience in a specialized field. By that, I mean our training programs allow you to select the special kind of work which meets your interests—manufacturing, engineering, or technical marketing—and then rotate assignments to give you broad experience within that area.

**Q. Are training assignments of a pre-determined length and type or does the individual have some influence in determining them?**

A. Training programs, by virtue of being programs, have outlined assignments but still provide real opportunities for self-development. We try our best to tailor assignments to the individual's desires and demonstrated abilities.

**Q. Do you mean, then, that I could just stay on a job if I like it?**

A. That's right. Our programs are both to train you and help you find your place. If you find it somewhere along the way, to your satisfaction and ours, fine.

**Q. What types of study courses are included in the training programs and when are the courses taken?**

A. Each of our programs has graduate-level courses conducted by experienced G-E engineers. These courses supplement your college training and tie it in with required industrial techniques. Some are taken on Company time, some on your own.

**Q. What kind of help do you offer employees in getting graduate schooling?**

A. G.E.'s two principal programs of graduate study aid are the Honors Program and the Tuition Refund Program. If accepted on the Honors Program you can obtain a master's degree, tuition free, in 18 months while earning up to 75% of full-time salary. The Tuition Refund Program offers you up to 100% refund of tuition and related fees when you complete graduate courses approved by your department manager. These courses are taken outside normal working hours and must be related to your field of work.

**Q. What are the benefits of joining a company first, then going into military service if necessary.**

A. We work it this way. If you are hired and are only with the Company a week before reporting to military service, you are considered to be performing continuous service while you are away and you will have your job when you return. In determining your starting salary again, due consideration is given experience you've

gained and changes in salary structure made in your absence. In addition, you accrue pension and paid-vacation rights.

**Q. Do you advise getting a professional engineer's license? What's it worth to me?**

A. There are only a few cases where a license is required at G.E., but we certainly encourage all engineers to strive for one. At present, nearly a quarter of our engineers are licensed and the percentage is constantly increasing. What's it worth? A license gives you professional status and the recognition and prestige that go with it. You may find, in years to come, that a license will be required in more and more instances. Now, while your studies are fresh in your mind, is the best time to undertake the requirements.

Your next four years are most important. During that period you'll undoubtedly make your important career decisions, select and complete training programs to supplement your academic training, and pursue graduate schooling, if you choose. These are the years for personal development — for shaping yourself to the needs of the future. If you have questions still unanswered, write to me at Section 959-6, General Electric Co., Schenectady 5, N. Y.

**LOOK FOR other interviews discussing:** • Salary • Advancement in Large Companies • Qualities We Look for in Young Engineers.

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